February 14, 2011



MIL "ON" and/or Rattle Noise from Engine (2AR)

Service

Category Engine/Hybrid System

Section Engine Mechanical Market USA



Applicability

YEAR(S)	MODEL(S)	ADDITIONAL INFORMATION
2010 – 2011	Camry	Drive Type(s): 2WD Engine(s): 2AR Transmission(s): 6MT, 6AT VDS(s): BF3EK WMI(s): 4T1, 4T4, JTN
2009 – 2010	RAV4	Drive Type(s): 4WD, 2WD Engine(s): 2AR Transmission(s): 4AT VDS(s): BF31V, BF32V, BF33V, BF34V, BF35V, BF4DV, DF4DV, EF4DV, JF4DV, KF4DV, RF4DV, WF4DV, XF4DV, YF4DV, ZF31V, ZF32V, ZF33V, ZF34V, ZF35V, ZF4DV WMI(s): 2T3, JTM

TSB REVISION NOTICE

July 28, 2011 Rev1:

• Introduction, Production Change Information, Warranty, and Parts Information has been updated.

Any previous printed versions of this service bulletin should be discarded.

T-SB-0012-11

Introduction

Some 2010 – 2011 model year Federal Emissions Specification Camry vehicles and 2009 – 2011 model year RAV4 vehicles equipped with the 2AR-FE engine may exhibit one or more of the following conditions:

February 14, 2011

- MIL "ON" with DTC P0015 and/or P0017 setting
 - P0015 Camshaft position "B" Timing over-retarded (Bank 1)
 - P0017 Crankshaft position Camshaft position correlation (Bank 1 Sensor B)
- · Rattle noise from the engine

Follow the repair procedure in this bulletin to address this condition.

NOTE

This TSB does NOT apply to 2010-2011 model year California Emissions Specification Camry vehicles.

Production Change Information

This TSB applies to the following vehicles:

- All 2010 Federal Emissions Specification Camry vehicles.
- 2011 Federal Emissions Specification Camry vehicles produced BEFORE the Production Change Effective VINs shown below.

MODEL	PLANT	DRIVETRAIN PRODUCTION CHANGE EFFECTIVE VIN	
Camry	TMMK Line 1		4T1BF3EK#BU182097
	TMMK Line 2	FWD	4T1BF3EK#BU646187
	SIA		4T4BF3EK#BR137403
	Tsutsumi		JTNBF3EK#B3009591

- All 2009 RAV4 vehicles.
- 2010 RAV4 vehicles produced BEFORE the Production Change Effective VINs shown below.

MODEL	PLANT	DRIVETRAIN	PRODUCTION CHANGE EFFECTIVE VIN
	ТММС	2WD	2T3#F##V#AW051643
		4WD	2T3#F##V#AW080481
DAV/4	Tahara Shokki	2WD	JTM#F##V#A5031691
RAV4		4WD	JTM#F##V#A5036832
		2WD	JTM#F##V#AD029196
		4WD	JTM#F##V#AD039824



Warranty Information

OP CODE	DESCRIPTION	MODEL	TIME	OFP	T1	T2
EG1015	R & R Camshaft Timing Exhaust Gear Assembly	Camry	2.6	13070-####		
EGIUIS		RAV4	2.4			
	Remove Oil Pan to Replace Additional	Camry	1.8		06	16
Combo A	Components as Needed & Remove Separated Camshaft Timing Exhaust Gear Pieces	RAV4 (2WD, 4WD)	1.9			
	Remove Timing Cover to Replace Additional Components as Needed & Remove Separated Camshaft Timing Exhaust Gear Pieces	Camry	8.5			
Combo B		RAV4 (2WD)	8.4			
		RAV4 (4WD)	9.2			

APPLICABLE WARRANTY

- This repair is covered under the Toyota Powertrain Warranty. This warranty is in effect for 60 months or 60,000 miles, whichever occurs first, from the vehicle's in-service date.
- Warranty application is limited to occurrence of the specified condition described in this bulletin.



MIL "ON" and/or Rattle Noise from Engine (2AR)

Parts Information

PREVIOUS PART NUMBER	CURRENT PART NUMBER	PART NAME	QTY	
13070-0V010 13070-0V011 13070-0V012 13070-36010 13070-36011	13070-0V013	Gear Assy, Camshaft Timing Exhaust (Federal Emissions Specification ONLY)	1	
11213-36020	Same	Gasket, Cylinder Head Cover	1	
11159-0V010	Same	Gasket, Camshaft Bearing Cap Oil Hole No. 1	2	
90430-A0001	Same	Gasket, Camshaft Bearing Cap Oil Hole No. 2	1	
11328-0V010	Same	Gasket, Timing Chain Tensioner	1	
11329-36010	Same	Gasket, Timing Chain Cover, No. 2	1	
The Following Part Is On	ly Necessary in the Case	of Oil Pan Sub-assembly Removal:		
15147-36010	Same	Gasket, Oil Strainer	1	
The Following Parts Are Only Necessary in the Case of Timing Cover Removal:				
15193-36010	Same	Gasket, Oil Pump No. 1	1	
15197-36010	Same	Gasket, Oil Pump No. 2	1	
11496-36010	Same	Gasket, Oil Hole Cover	1	

Required Tools & Equipment

REQUIRED EQUIPMENT	SUPPLIER	PART NUMBER	QTY
TIS Techstream* or Techstream Lite NOTE: Software version 5.10.029 or later is required.	ADE	TSPKG1 or TSLITEDLR01	1

SPECIAL SERVICE TOOLS (SST)	PART NUMBER	QTY
Torque Wrench Adapter*	09249-63010-01	1

MIL "ON" and/or Rattle Noise from Engine (2AR)

T-SB-0012-11

Required Tools & Equipment (Continued)

REQUIRED MATERIAL	QUANTITY
Toyota Genuine Seal Packing Black, Three Bond 1207B, or equivalent	As Needed
Engine Oil	As Needed
Coolant	As Needed

NOTE

- Additional Techstream units may be ordered by calling Approved Dealer Equipment (ADE) at 1-800-368-6787.
- Additional SSTs may be ordered by calling 1-800-933-8335.

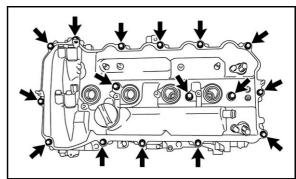
Repair Procedure Overview

- Remove the camshaft timing exhaust gear assembly.
- 2. Inspect the gear for separated pieces.
- 3. Remove the oil pan sub-assembly and timing cover as needed to remove the separated piece(s) and repair/replace additional components as needed.
- 4. Complete the repair.

Repair Procedure

- Confirm the customer complaint.
- 2. Remove the cylinder head cover.
 - A. Relocate the engine harness that lies across the top of the cylinder head cover.
 - B. Remove the ignition coils.
 - C. Remove the 16 bolts and cylinder head cover.

Figure 1.



- 3. Remove the chain tensioner.
 - A. Remove the right front wheel.
 - B. Remove the front fender apron seal RH.

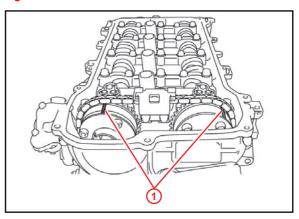
^{*} Essential SST.

T-SB-0012-11

Repair Procedure (Continued)

- C. Remove the V-ribbed belt for the vane pump.
- D. Rotate the crankshaft clockwise and set the No. 1 cylinder at +10° from the TDC/compression.
- E. After the timing marks are aligned on the VVT gear, place paint marks on the chain and both gears.

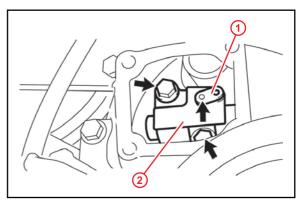
Figure 2.



1 Timing Marks

- F. Rotate the crankshaft counterclockwise by 10° and loosen the tension of the chain.
- G. Remove the timing chain cover plate.
- H. Align the holes of the stopper plate and tensioner, and insert a pin into the stopper plate hole to lock the tensioner.

Figure 3.



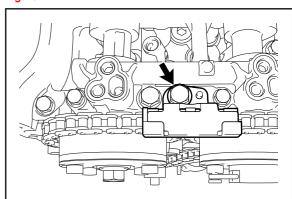
1	Stopper Plate
2	Timing Tensioner

I. Remove the 2 bolts and chain tensioner.

Repair Procedure (Continued)

4. Remove the timing chain guide by removing the bolt

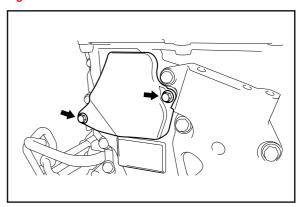
Figure 4.



Page 7 of 25

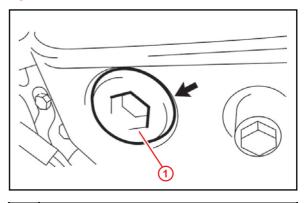
- 5. Remove the intake side VVT gear.
 - A. For Camry ONLY:
 Remove the 2 bolts and the No. 2 timing chain cover (Figure 5).

Figure 5.



B. Remove the service hole plug.

Figure 6.



1 Service Hole Plug

Page 8 of 25



MIL "ON" and/or Rattle Noise from Engine (2AR)

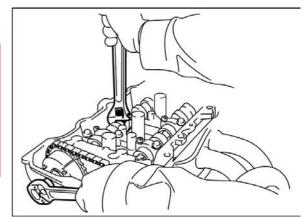
Repair Procedure (Continued)

C. Insert the tool through the service hole and remove the bolt of the intake VVT gear while holding the camshaft stationary with a wrench.

NOTICE

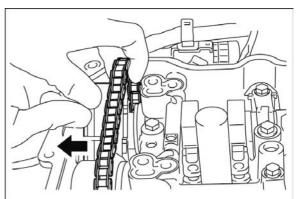
- Be careful NOT to damage the cylinder head or spark plug tube with the wrench.
- Do NOT disassemble the camshaft timing gear.

Figure 7.



D. After the VVT gear is slid in the arrow direction as shown in Figure 8, lower the VVT gear and remove the chain from the VVT gear.

Figure 8.



E. Remove the VVT gear from the cam housing.

T-SB-0012-11

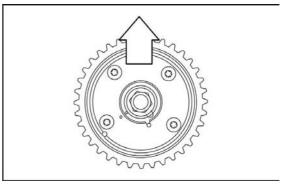
Repair Procedure (Continued)

F. Tie the timing chain to ensure it stays properly aligned with the exhaust and crankshaft timing gear pulleys.

NOTICE

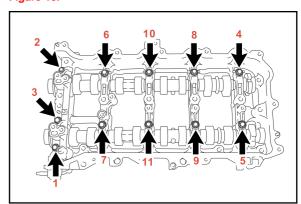
The VVT gear bolts may interfere with the housing during removal. After the VVT gear slides out from the camshaft, carefully rotate the VVT gear to the position shown in Figure 9 to avoid interference and remove it in the arrow direction shown.

Figure 9.



- 6. Remove the exhaust camshaft assembly with exhaust VVT gear.
 - A. Remove the 11 bearing cap bolts in the sequence shown in the illustration.

Figure 10.

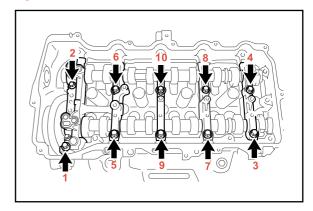


T-SB-0012-11

Repair Procedure (Continued)

B. Using several steps, remove the 10 bearing cap bolts in the sequence shown in the illustration.

Figure 11.



C. Remove the 5 bearing caps.

HINT

Arrange the removed bearing caps in order to ensure they are installed in their original locations during reassembly.

- D. Remove the exhaust camshaft assembly with camshaft timing exhaust gear.
- E. Place additional ties on the timing chain to ensure it stays properly aligned with the crankshaft timing gear pulley.
- F. Place the exhaust camshaft with camshaft timing exhaust gear in a vise.

HINT

Cover the vise with tape and only apply pressure to one of the hexagonal portions of the camshaft.

G. Remove the bolt and camshaft timing exhaust gear assembly.

February 14, 2011

Figure 12.

MIL "ON" and/or Rattle Noise from Engine (2AR)

Repair Procedure (Continued)

H. Inspect the camshaft timing exhaust gear assembly.

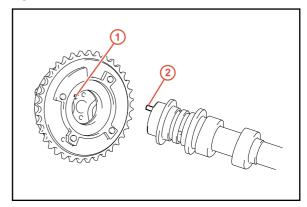
Is there a section separated from the gear as shown in Figure 12?

- YES Go to "Additional Repair Procedure: Part A" in this TSB for removal of the oil pan and, if necessary, the timing cover assembly, to remove the separated piece(s) and perform additional repairs.
- NO Go to step 7.

7. Install the new camshaft timing exhaust gear assembly.

A. Align and attach the knock pin of the No. 2 camshaft with the pin hole of the camshaft timing exhaust gear.

Figure 13.



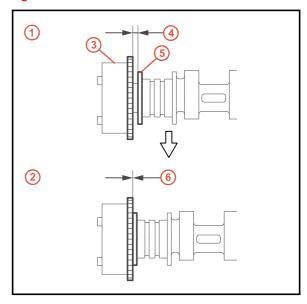
1	Pin Hole
2	Knock Pin



Repair Procedure (Continued)

B. Check that there is no clearance between the camshaft timing exhaust gear and camshaft flange.

Figure 14.



1	Incorrect
2	Correct
3	Camshaft Timing Exhaust Gear
4	Clearance
5	Flange
6	No Clearance

C. With the exhaust camshaft still secured in the vise, install the bolt.

Torque: 85 N*m (867 kgf*cm, 63 ft*lbf)

- D. Clean the camshaft journals, camshaft housing, and bearing caps.
- E. Apply a light coat of engine oil to the camshaft journal, camshaft housing, and bearing caps.
- F. Install the exhaust camshaft with new camshaft timing exhaust gear assembly installed.

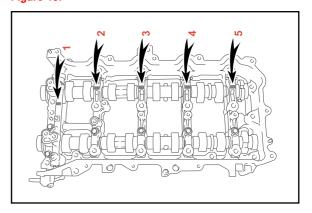
Page 13 of 25

MIL "ON" and/or Rattle Noise from Engine (2AR)

Repair Procedure (Continued)

- 8. Install the camshaft bearing cap.
 - A. Confirm the marks and numbers on the camshaft bearing caps and place them in their proper positions and directions.

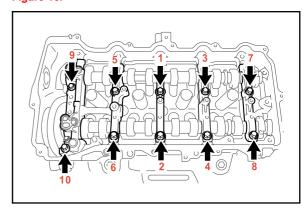
Figure 15.



B. Using several steps, uniformly tighten the 10 bolts in the sequence shown in the illustration.

Torque: 27 N*m (275 kgf*cm, 20 ft*lbf)

Figure 16.



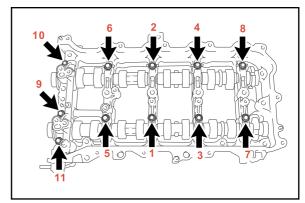
C. Install the 11 bolts in the order shown in the illustration.

Torque: 16 N*m (163 kgf*cm, 12 ft*lbf)

NOTICE

Make sure that the camshaft rotates smoothly after installing the bearing caps.

Figure 17.





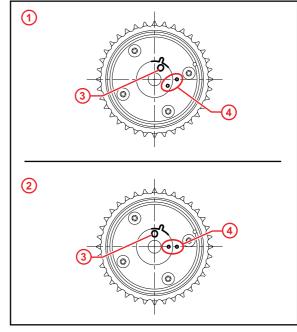
Repair Procedure (Continued)

- 9. Install the intake side VVT gear.
 - A. Confirm the gear is in the unlocked position prior to installation.

NOTICE

The camshaft timing gear MUST be in the unlocked position when installing on the camshaft to prevent damage to the lock pin during tightening. Please see step 9D for instructions to unlock the camshaft timing gear.

Figure 18.



1	Advanced (Unlocked) Position
2	Retarded (Locked) Position
3	Knock Pin Hole
4	Alignment Mark

B. Remove any remaining ties from the timing chain.

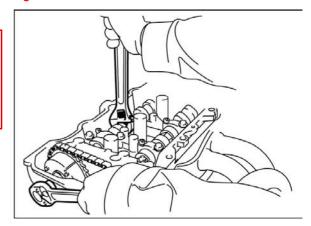
Repair Procedure (Continued)

C. Insert the tool from the service hole and install the bolt of the intake VVT gear.

NOTICE

Make sure NOT to lock the camshaft timing gear. If the camshaft timing gear is locked, release the lock according to the following procedure (step 9D).

Figure 19.



D. Inspect the camshaft timing gear lock.

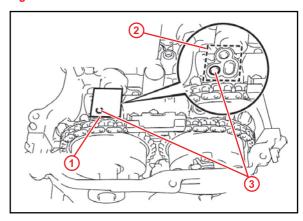
If the camshaft timing gear is locked, release the lock according to the following procedure.

(1) After cleaning and degreasing the intake side VVT oil hole on the No. 1 camshaft bearing cap, completely seal the oil hole with adhesive tape or equivalent as shown to prevent air from leaking.

NOTICE

Be sure to seal the oil hole completely because air leaks due to insufficient sealing will prevent the lock pin from being released.

Figure 20.



1	Adhesive Tape
2	Adhesive Tape Sealing Area
3	Small Hole Here

(2) Make a hole in the adhesive tape covering the oil hole as shown in Figure 20.



Repair Procedure (Continued)

(3) Apply approximately 200 kPa (2.0 kgf/cm², 29 psi) of air pressure to the hole made in the preceding step, then forcibly turn the camshaft timing gear assembly in the advance direction (counterclockwise).

CAUTION

Cover the oil passages with a piece of cloth when applying pressure to keep oil from splashing.

NOTICE

- If air leaks out, reattach the adhesive tape.
- Do NOT allow the camshaft timing gear assembly to lock. If it locks, release the lock pin again.

HINT

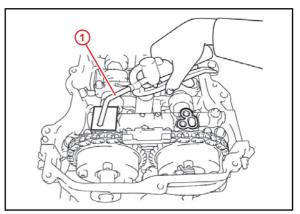
- The camshaft timing gear assembly may be turned in the advance direction without applying any force.
- If enough air pressure cannot be applied because of air leakage from the port, releasing the lock pin may be difficult.
- (4) Remove the adhesive tape on the VVT hole.
- E. Tighten the bolt of the intake VVT gear.

Torque: 85 N*m (867 kgf*cm, 63 ft*lbf)

F. Lock the gear by rotating the camshaft timing gear assembly clockwise.

Figure 21.

February 14, 2011



1 Compressed Air

Page 17 of 25

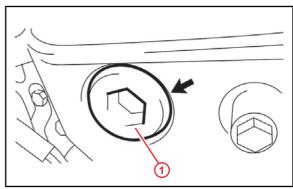
MIL "ON" and/or Rattle Noise from Engine (2AR)

Repair Procedure (Continued)

10. Install the service hole plug with a new gasket.

Torque: 30 N*m (306 kgf*cm, 22 ft*lbf)

Figure 22.



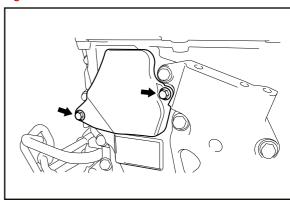
Service Hole Plug

11. For Camry ONLY:

Install the No. 2 timing chain cover with the 2 bolts.

Torque: 10 N*m (102 kgf*cm, 7 ft*lbf)

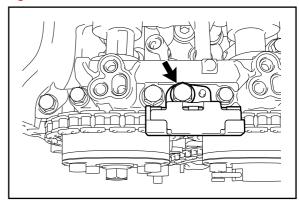
Figure 23.



12. Install the timing chain guide with the bolt.

Torque: 21 N*m (214 kgf*cm, 15 ft*lbf)

Figure 24.



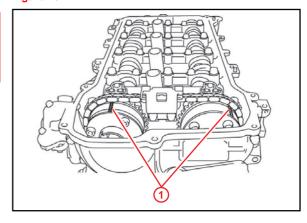
Repair Procedure (Continued)

13. Install the chain to the VVT gear.

NOTICE

Align the marks that were placed on the gears and chain.

Figure 25.



Timing Marks

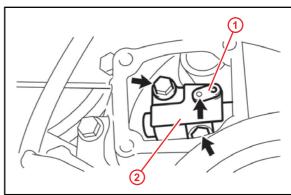
- 14. Install the chain tensioner.
 - A. Install the chain tensioner to the service hole.

 Torque: 10 N*m (102 kgf*cm, 7 ft*lbf)
 - B. When installing the tensioner, pull out the pin and release the tensioner.
 - C. Install the timing chain cover plate.

Install a new gasket and the timing chain cover plate with the 4 bolts.

Torque: 10 N*m (102 kgf*cm, 7 ft*lbf)

Figure 26.



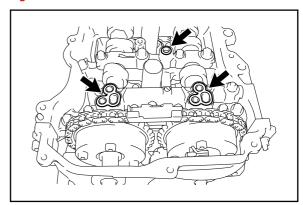
1	Stopper Plate
2	Timing Tensioner

- 15. Install the cylinder head cover sub-assembly.
 - A. Apply a light coat of engine oil to 3 new gaskets.

Repair Procedure (Continued)

B. Install the 3 gaskets to the camshaft bearing caps.

Figure 27.



Page 19 of 25

C. Install a new gasket to the cylinder head cover.

NOTICE

Remove any oil from the contact surface.

D. Apply seal packing as shown.

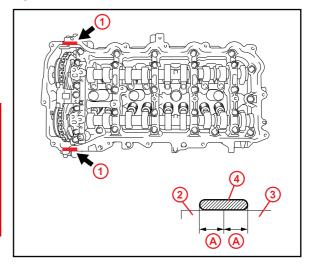
Seal Packing: Toyota Genuine Seal Packing Black, Three Bond 1207B, or equivalent Standard Seal Diameter: 3.0 to 6.0 mm (0.118 to 0.236 in.)

Application Width A: 5.0 mm (0.197 in.)

NOTICE

- Remove any oil from the contact
- Install the cylinder head cover within 3 minutes and tighten the bolts within 15 minutes after applying seal packing.

Figure 28.



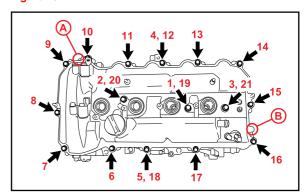
1	Seal Packing
2	Timing Chain Cover
3	Camshaft Housing
4	3.0 to 6.0 mm
Α	Application Width "A"

MIL "ON" and/or Rattle Noise from Engine (2AR)

Repair Procedure (Continued)

E. Align the cylinder head cover with pin A. Then align the cylinder head cover with pin B and install the cylinder head cover.

Figure 29.



Α	Pin A
В	Pin B

F. Install the 16 bolts and then tighten the bolts in the order shown in Figure 29.

Torque: 12 N*m (122 kgf*cm, 9 ft*lbf)

NOTICE

Do NOT fill the engine with oil or start and run the vehicle for at LEAST 4 hours after the installation.

- G. Confirm proper engine and coolant levels prior to starting the engine and test driving the vehicle.
- H. Clear DTCs with Techstream.
- 16. Confirm the repair.

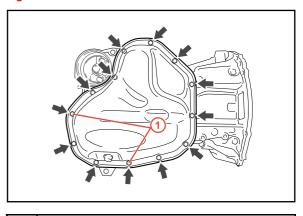
Additional Repair Procedure: Part A

Remove the oil pan sub-assembly to remove the separated piece(s) of the camshaft timing exhaust gear and repair/replace additional components as needed.

Removal

- 1. Remove the oil pan sub-assembly.
 - A. Remove the 11 bolts and 2 nuts.

Figure 30.



Page 21 of 25

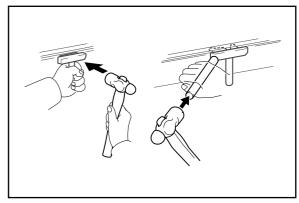
Nuts

B. Insert the blade of an oil pan seal cutter between the oil pan and stiffening crankcase, cut off the applied sealer, and remove the oil pan.

NOTICE

- Be careful NOT to damage the stiffening crankcase contact surface of the oil
- Be careful NOT to damage the stiffening crankcase flange.

Figure 31.



MIL "ON" and/or Rattle Noise from Engine (2AR)

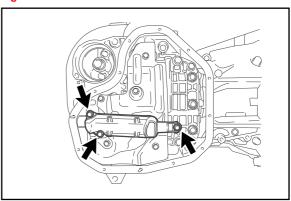
Additional Repair Procedure: Part A

TOYOTA

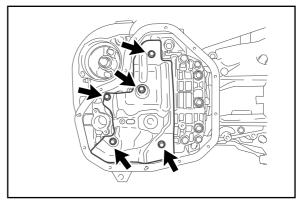
Removal (Continued)

2. Remove the oil strainer sub-assembly by removing the 3 bolts, oil strainer, and gasket.

Figure 32.



3. Remove the No. 1 oil pan baffle plate by removing Figure 33. the 5 bolts.



- 4. Remove the separated piece(s) of the camshaft timing exhaust gear assembly.
- 5. Clean the oil pan sub-assembly and related components prior to reassembly.

Additional Repair Procedure: Part A (Continued)

Installation

1. Install the No. 1 oil pan baffle plate.

Install the oil pan baffle plate and uniformly tighten the 5 bolts in several steps, in the sequence shown in the illustration.

Torque: 10 N*m (102 kgf*cm, 7 ft*lbf)

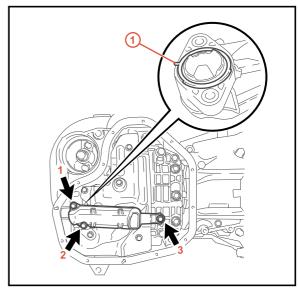
Page 23 of 25

- 2. Install the oil strainer sub-assembly.
 - A. Apply a light coat of engine oil to a new gasket.
 - B. Align the protrusion of the gasket with the cutout of the oil strainer, and install the gasket to the oil strainer.
 - C. Install the oil strainer with the 3 bolts in several steps, in the sequence shown in the illustration.

Torque: 10 N*m (102 kgf*cm, 7 ft*lbf)

Figure 35.

Figure 34.



Protrusion



Additional Repair Procedure: Part A

Installation (Continued)

- 3. Install the oil pan sub-assembly.
 - A. Apply seal packing in a continuous line as shown in the illustration.

Seal Packing: Toyota Genuine Seal Packing Black, Three Bond 1207B, or equivalent

Standard Seal Diameter: 2.5 to 3.5 mm (0.0984 to 0.138 in.)

NOTICE

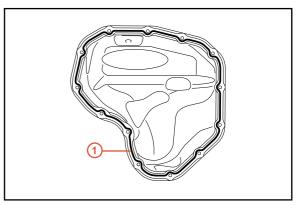
- Remove any oil from the contact surface.
- Install the oil pan within 3 minutes and tighten the bolts and nuts within 10 minutes after applying seal packing.
- Do NOT apply oil for at least 4 hours after the installation.
- 4. Install the oil pan with the 11 bolts and 2 nuts in several steps, in the sequence shown in the illustration.

Torque: 10 N*m (102 kgf*cm, 7 ft*lbf)

HINT

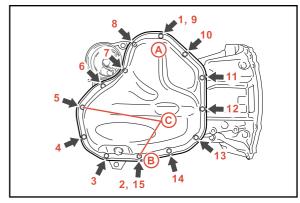
Bolt A and nut B are tightened twice.

Figure 36.



1 Seal Packing: 2.5 to 3.5 mm

Figure 37.



Α	Bolt A
В	Nut B
С	Nuts

- 5. Were all the separated pieces of the camshaft timing exhaust gear found?
 - YES Go to "Repair Procedure", step 7.
 - NO Go to "Additional Repair Procedure: Part B".

Additional Repair Procedure: Part B

1. Remove the timing chain cover to remove the separated piece(s) of the camshaft timing exhaust gear and repair/replace additional components as needed.

Refer to the Technical Information System (TIS), applicable model and model year Repair Manual:

- 2009 RAV4: Engine/Hybrid System – Lubrication – "2AR-FE Lubrication: Oil Pump: <u>Removal</u> / <u>Installation</u>"
- 2010 RAV4: Engine/Hybrid System – Lubrication – "2AR-FE Lubrication: Oil Pump: Removal / Installation"
- 2010 Camry: Engine/Hybrid System – Lubrication – "2AR-FE Lubrication: Oil Pump: Removal / Installation"
- 2011 Camry: Engine/Hybrid System – Lubrication – "2AR-FE Lubrication: Oil Pump: <u>Removal</u> / <u>Installation</u>"
- 2. Go to "Repair Procedure", step 7, to complete the repair.